



**ENFHEX**  
European Network of  
Forensic Handwriting Experts



NACIONALNI FORENZIČNI LABORATORIJ  
NATIONAL FORENSIC LABORATORY  
REPUBLIKA SLOVENIJA / REPUBLIC OF SLOVENIA

## 11<sup>th</sup> ENFHEX CONFERENCE AND BUSINESS MEETING 2017

Forensic Handwriting: how do we report our findings?

Bled, Slovenia  
4<sup>th</sup> – 6<sup>th</sup> October 2017



## TIMETABLE

Wed, 4 <sup>th</sup> October 2017	
16:00 - 18:00	Steering Committee meeting
17:00 - 18:00	Registration

Thu, 5 <sup>th</sup> October 2017	
07:30 – 08:30	Registration
08:30 – 08:50	Opening Addresses <i>Dorijan Keržan, Director NFL, Slovenia</i> <i>Jonathan Morris, Chairman ENFHEX</i>
08:50 – 09:00	The European Platform for Experts (EPE and the ENFHEX website) <i>Thomasz Dziedzic, Vice-Chairman ENFHEX</i>
<b>Session 1</b>	<b>Moderator Axel Kerkhoff</b>
09:00 – 09:20	Neuroscientific challenge to handwriting (examination) <i>Dorijan Keržan, National forensic laboratory, Ljubljana, Slovenia</i>
09:20 – 09:40	Latin vs Cyrillic script, possibilities of expert examination and evaluation <i>Andrea Ledić, Forensic Science Centre "Ivan Vučetić", Zagreb, Croatia</i>
09:40 – 10:00	VSC 80 <i>Nicholas Crabb, Foster + Freeman Ltd., Evesham, United Kingdom</i>
10:00 – 10:40	Photo Session Coffee Break
10:40 – 11:00	Operation Screenplay – Reporting an International handwriting investigation <i>Jonathan Morris, SPA Forensic Services, Glasgow, United Kingdom</i>

<b>Session 2</b>	<b>Moderator Jonathan Morris</b>
11:00 – 12:30	Workshop 1 - Context Bias in forensic handwriting <i>Mara Merlino, Division of Behavioural and Social Sciences, Kentucky State University, United States of America</i>
12:30 – 13:30	Lunch Break
13:30 – 15:00	Workshop 2 - Logical Reasoning in interpretive evidence <i>Jonathan Morris, SPA Forensic Services, Glasgow, United Kingdom</i>
<b>Session 3</b>	<b>Moderator Tomasz Dziedzic</b>
15:00 – 15:20	Desirable properties of an expert's report <i>Raymond Marquis, School of Criminal Justice, Lausanne, Switzerland</i>
15:20 – 15:40	Contextual bias in forensic examination: examples in actual cases <i>Nikolaos Kalantzis, Chartoularios P.C., Laboratory of Questioned Document Studies, Pireaus, Greece</i>
15:40 – 16:00	Coffee Break
16:00 – 16:20	Forensic handwriting examination in the age of forensic intelligence versus bias <i>Nellie Cheng, Health Sciences Authority Singapore</i>
16:20 – 16:40	Open discussion / WS feedback

<b>Fri, 6<sup>th</sup> October 2017</b>	
<b>Session 4</b>	<b>Moderator Gerhard Grube</b>
08:30 – 10:00	Workshop 3 – Digitally captured signatures / handwriting <i>Nick Mettyear, Joerg Prinzhorn, Wacom</i>
10:00 – 10:20	Coffee Break
10:20 – 10:40	Traits of simulation in digitally captured signatures <i>Tomasz Dziedzic, Institute of Forensic Research, Krakow, Poland</i>

10:40 – 10:55	What is the value of simple signature elements? <i>Erich Kupferschmid, Forensic Science Institute Zurich, Switzerland</i>
10:55 – 11:15	Effect of visual feedback on the static and kinetic individual characteristics of cursive and block handwriting <i>Michael Pertsinakis, Chartoularios P.C., Laboratory of Questioned Document Studies, Pireaus, Greece</i>
11:15 – 11:55	Workshop 4, part 1 – Simulating and Examining Digitally Captured Signatures <i>Jonathan Heckeroth, Axel Kerkhoff, Forensic Science Institute Wiesbaden, Germany</i> <i>Erich Kupferschmid, Forensic Science Institute Zurich, Switzerland</i>
11:55 – 12:10	ICP grant project on DCS underway <i>Jan Zimmer, Institute of Criminalistics Prague, Czech Republic</i>
12:10 – 12:20	Selected Aspects of Actual Cases <i>Nikolaos Kalantzis, Chartoularios P.C., Laboratory of Questioned Document Studies, Pireaus, Greece</i>
12:20 – 13:20	Lunch Break
13:20 – 14:10	Workshop 4, part 2 – Simulating and Examining Digitally Captured Signatures <i>Jonathan Heckeroth, Axel Kerkhoff, Forensic Science Institute Wiesbaden, Germany</i> <i>Erich Kupferschmid, Forensic Science Institute Zurich, Switzerland</i>
14:10 – 14:30	Open discussion / WS feedback
14:30 – 14:50	Coffee Break
14:50 - 16:00	Business Meeting
16:00	Close of meeting

## POSTERS - ABSTRACTS:

1. Combinatorics and handwriting examination

Špela Rome, Dorijan Keržan, Andrej Gerjevič, National forensic laboratory, Ljubljana, Slovenia

*Handwriting of 55 children was used to show variability of handwriting of 10 years old. Using the ideal word in Slovenian language, which is of average length for the language and using most and least common letters, that include main features found in the alphabet and the variability found in writers, the short combinatoric experiment will show in how many ways "ideal" word can theoretically be written in particular language. It will be proposed that this is a possible argument to present evidence of uniqueness of handwriting, which is accepted rather non-critically in forensic handwriting society.*

2. Can handwriting help ascertain identity / nationality?

Gunhild Isager, National Criminal Investigation Service, Oslo, Norway

*Images of handwriting from three different cases concerning deceased foreign citizens. This is an informal enquiry to help ascertain their identities/nationalities. Can handwriting be of assistance? Are any of the traits recognizable? Please give your feedback.*

3. The potential of collaborative learning as a tool for forensic students: application to handwriting comparison

Raymond Marquis, Liv Cadola, Anne Bannwarth, Sarah Hochholding, Céline Weyermann, School of Criminal Justice, Lausanne, Switzerland

*Handwriting and signature examination is one of the forensic disciplines taught at the School of Criminal Justice of the University of Lausanne. The course originally included both theory – given as ex-cathedra lectures and presentation of case examples - and optional practical exercises.*

*The students' practical works as well as their feedbacks on the theoretical class highlighted a general difficulty to transfer concepts from theory to practice. In fact, even if signature and handwriting examination might often be falsely considered as a simple expertise field (i.e. everybody can to some extent recognize the writings of friends and family members), it shows all its complexity and subtlety when practical implementation is required with a significant risk of false conclusions for novices and untrained "experts". The traditional learning approach did not allow students to become reliable experts in making the distinction between authentic, simulated and disguised writings. The repercussions of incorrect scientific examination can be particularly problematic if the students remain unaware of these issues before they are confronted to real caseworks.*

*Thus, an educational project was funded by the University of Lausanne to stimulate student to learn signature analysis, comparison and evaluation using a collaborative learning approach. The students were actively engaged in their learning to solve day-to-day problems in different roles (e.g. victims, forger, experts, and teachers). The results of this project will be presented and the advantages of this novel approach will be discussed.*

4. To Line or not to Line: What can be deduced from Line quality?

Nicole Crown-Burri, Forensic Science Institute Zurich, Switzerland

*The poster demonstrates peculiarities of line quality resulting from less common writing instruments and writers. Disturbances caused by simulation, uneven writing surfaces etc. are compared and documented.*

5. The Line at the End of Life

Nicole Crown-Burri, Forensic Science Institute Zurich, Switzerland

*This poster represents a study of suicide letters collected during case work. Changes in handwriting due to external influences, such as CO-inhalation, drugs, medication and alcohol were observed and documented.*

6. Reporting the findings of 'guided hand' signature cases

Nicola Musgrave, LGC Limited, Teddington, United Kingdom

*A casework example demonstrating the issues surrounding the reporting of 'guided hand' signature opinions. The case involved allegations of an ex-husband forging the signatures of his 50 year old wife on several mortgage/bank documents. She had recently suffered from cerebellar ataxia which had left her severely disabled. The accused alleged that it had been necessary to assist his wife to sign the documents due to her damaged fine motor skills after the illness. Expert opinions were given taking into consideration the circumstances of the case.*

7. Preparing Forensic Handwriting Report / Present and Future

Frida Kohar, Ildiko Sajgo, Erika Bencsik, Hungarian Institute for Forensic Sciences, Budapest, Hungary

Bence Kovari, Budapest University of Technology and Economics, Hungary

*In alignment with the theme of the conference we present on this poster how a Forensic Handwriting Report is prepared at the Hungarian Institute for Forensic Sciences, including the steps of the examination and the structure of the report.*

*We outline and illustrate our ongoing improvements, SigRep and SigStat softwares developed by the Budapest University of Technology and Economics and our future plans.*

8. First Steps towards a Bayesian Framework for Handwriting Examination at the National Bureau of Investigation Finland

Elina Rönkä, Tuomas Salonen – National Bureau of Investigation Forensic Laboratory, Vantaa, Finland

*The verbal probability scale, currently used for handwriting examinations at the NBI Finland Forensic Laboratory, provides the strength of probability that an item of questioned handwriting was written by a particular person. According to the ENFSI Guideline for Evaluative Reporting in Forensic Science, the conclusion should express the degree of support provided by forensic findings for one proposition versus a specified alternative, depending upon the magnitude of the likelihood ratio. The change of the current verbal scale will involve considerably more than a simple adjustment to the wording. Indeed, the demands and consequences of such a change will require careful analysis and thorough understanding of the Bayesian approach.*

*As a first step towards a more Bayesian way of thinking, a new approach to the documentation of handwriting examinations will be considered in order to facilitate comparison of findings under differing hypotheses. A computerized method of documenting handwriting examinations has been in use at the NBI since 2015. There are plans to revise the current method of documentation in order to allow greater transparency in relation to the process of reaching conclusions for opposing hypotheses.*

*Changing the method of documentation will provide a starting point towards a Bayesian approach and it will, perhaps, make it easier to continue developing the evaluation of forensic findings in line with the recommendations provided by the ENFSI Guideline.*

9. Determination of Relation Between Handwritings and Signature

Asuman Aydın, Umut Hakan Özkara - Gendarmerie forensic Institute, Ankara, Turkey

*We tried to find some similarities between handwritings and signatures and make a decision how we reach owners of signatures or writings with this and find solutions.*

**PRESENTATIONS - ABSTRACTS:**

1. Neuroscientific challenge to handwriting (examination)

Dorijan Keržan, National forensic laboratory, Ljubljana, Slovenia

*The aim of the paper is to present possible argument about scientific nature of forensic handwriting examination. Following questioning of validity of handwriting examination by Saks and Risinger in USA a lot of research has been done in the field, including neuroscientific approach. Handwriting as cultural human feature is a skill requiring involvement of different cognitive and neural parts of the human brain.*

*Handwriting will be discussed as a human feature, which links evolution of human hand, prehension and salience, brain control and motor control. Theoretical background of science of handwriting (examination) will be proposed for further discussion, based on handwriting as biometric feature, and on neuroscientific and cognitive grounds.*

2. Latin vs Cyrillic script, possibilities of expert examination and evaluation

Andrea Ledić, Forensic Science Centre "Ivan Vučetić", Zagreb, Croatia

*In forensic analysis, which includes DNA, fingerprint, toxicological analysis etc., handwriting examination is part of the area of expert evaluation of documents or documents examination. Identifying handwriting has always represented a challenge as there is no such instrument that could identify the writer in a clear and unambiguous way. In fact, identification has to be made by handwriting experts, while instruments are used only as tools in their work.*

*Materials used for handwriting and signature examination involve all types of documents, including wills, contracts, checks, credit card sales slips, anonymous letters, threatening messages, receipts, authorizations, farewell letters, notary public registers, passports, notes, lottery tickets etc.*

*The aim of this paper is to examine the possibilities of handwriting analysis of documents written in different alphabets (Latin vs Cyrillic alphabet and vice versa).*

*The professional standards used for evaluating handwriting and signature in the Latin alphabet can also be applied to those in the Cyrillic alphabet. The most important element is the movement of a writing instrument on a writing surface, leaving a trace on the paper that has an important role in identifying the writer.*

*Croatian alphabet has 30 letters, and 27 of them contain one character only. The Cyrillic alphabet is used by some Slavic languages: Russian, Ukrainian, Serbian, Macedonian and Montenegrin. The Cyrillic alphabet has from 30 to 40 letters, depending on the language using it. If the lists of letters of both alphabets are compared, you can notice that there are also letters whose form is the same both in the Latin and Cyrillic alphabet, but they are pronounced in a different way.*

*In order to answer research questions in this paper, testing and an analysis have been conducted of the handwriting of 12 volunteers from the Vukovar area (a place in Croatia near the Serbian border) who use both alphabets on a daily basis.*

3. VSC 80

Nicholas Crabb, Foster + Freeman Ltd., Evesham, United Kingdom

4. Operation Screenplay – Reporting an International handwriting investigation

Jonathan Morris, SPA Forensic Services, Glasgow, United Kingdom

*Acting on intelligence received from international partners, in April 2015 officers of the National Crime Agency (NCA) and Her Majesty's Border Force (HMBF) intercepted and boarded the tug boat MV Hamal. The tug boat, crewed by nine Turkish nationals, was escorted back to Aberdeen harbour where an extensive search led to the recovery of 3.2 tonnes of cocaine (with a street value of £512 million). Given the sophisticated precautions used by the smugglers, the forensic opportunities were extremely limited. This presentation will describe one of the more critical aspects of the investigation that was critical in the subsequent prosecution and conviction of some of the suspects.*

*As well as aspects of the search and recovery of the drugs this talk will cover the forensic handwriting aspect of the investigation, including comment on the complexity of the examination, the limitations encountered during the laboratory process, the overall handwriting findings, as well as how the case was presented in court, including the first use of a multi-media presentation to demonstrate the findings.*

5. Desirable properties of an expert's report

Raymond Marquis, Alex Biedermann, Liv Cadola, Christophe Champod, Line Gueissaz, Geneviève Massonnet, Williams David Mazzella, Franco Taroni, Tacha Hicks, School of Criminal Justice, Lausanne, Switzerland

*The presentation entitled "Desirable properties of an expert's report" describes what a written statement about signature or handwriting evidence should include in terms of findings evaluation. It should, first, satisfy the ENFSI guideline for evaluative reporting, and thus respect the three principles of interpretation (i.e. take into account relevant case circumstances, evaluate the results of the observations and not the propositions, evaluate the results in the light of at least two competing propositions). It should also express the value of the evidence numerically, using the likelihood ratio. The ENFSI guideline leaves the expert the liberty to choose to communicate the value of the evidence by means of a number or a verbal equivalent. We are of the view, however, that verbal terms are not clear enough and should not be used in isolation. Further, an expert report may contain several examples showing how the likelihood ratio combines with prior probabilities of the propositions. This would provide the recipient of information with some keys to understand the impact of the evidence in the case at hand. This presentation is mainly based on discussions held in the School of Criminal Justice that are formalized in the following paper: Marquis R., Biedermann A., Cadola L., Champod C., Gueissaz L., Massonnet G., Mazzella W.D., Taroni F., Hicks T. Discussions on how to implement a verbal scale in a forensic laboratory: Benefits, pitfalls and suggestions to avoid misunderstandings, Science & Justice 56 (2016) 364-370.*

6. Contextual bias in forensic examination: examples in actual cases

Nikolaos Kalantzis, Reinoud Stoel, Chartoularios P.C., Laboratory of Questioned Document Studies, Pireaus, Greece

*Contextual information can and should have a profound effect on human judgement in a forensic setting. While all will agree that relevant contextual information should be taken in the judgment, there is much more disagreement on what to do irrelevant contextual information. This is rather odd, because just as relevant information, irrelevant information can also affect the interpretation and conclusion, resulting in what we term 'contextual bias'. After a walkthrough of the cognitive architecture of the human brain and an overview of different categories of bias, actual cases will be presented and discussed where the handwriting expert may render a biased conclusion if proper precautions are not in place. We*

will end with a presentation of a procedure known as Contextual Information Management (CIM) that may aid in minimizing the risk of bias.

7. Forensic handwriting examination in the age of forensic intelligence versus bias

Nellie Cheng, Shing Min Lim, Jing Liu, Yi Hui Ngor, Health Sciences Authority Singapore

*While forensic intelligence is perceived by some practitioners as the intentional role of forensic science in national and global security, ample case background information or priori knowledge may pose a risk in introducing bias in evaluating and reporting findings. In this presentation, the author will share with the audience the practice of the Laboratory and also the examiner's endeavour to use likelihood ratio to evaluate the findings.*

8. Traits of simulation in digitally captured signatures

Tomasz Dziedzic, Institute of Forensic Research, Krakow, Poland

*Forensic examination of traditional (pen-and-paper) handwriting does not allow for numerical expression of some motor features, such as speed of writing or pressure exerted by a writing instrument on writing surface. They could only be estimated based on e.g. line quality or depth of indentations. With the rise of digitally captured signatures (DCS), these biometric features can be precisely measured and compared between disputed and reference samples. In order to better understand opportunities provided by this new technology, the following experimental research was conducted. Firstly, one individual produced 10 natural signatures with Wacom Intuos Pro tablet and Inking Pen stylus. Secondly, ten other people executed simulations of these signatures (20 samples each, 200 in total) with the same equipment. Half of these samples were produced ad hoc (without any preparations) and the other half after some training (the number of try-outs was not limited). The comparison of time of execution, speed of writing, pen pressure and number of pen lifts revealed how these characteristics differed in the original signatures and their simulations. These results may serve as a reference for FHEs who encounter disputed DCS in their casework.*

9. What is the value of simple signature elements?

Erich Kupferschmid, Forensic Science Institute Zurich, Switzerland

*The aim of this study was to research the evidential strength of electronically captured handwritten signatures. Samples of 11 elements from 6 different genuine signatures and simulations from 26 forgers were collected using Apple's iPad Pro in combination with the Apple Pencil. The signature elements were examined using Dynamic Time Warping to compare the local features coordinates, pressure, velocity and azimuth as well as by extracting of the global features total time, average velocity, distance and relative size. Most of these features were found to discriminate between genuine and simulated signatures, with only a few exceptions. It was possible to estimate achievable Likelihood Ratios for well corresponding signatures.*

10. Effect of visual feedback on the static and kinetic individual characteristics of cursive and block handwriting

Michael Pertsinakis, Chartoularios P.C., Laboratory of Questioned Document Studies, Pireaus, Greece

*Handwriting is a motor skill defined in a two-dimensional spatial domain, consisted of three major levels through which the motor units that contain the letter trajectories are retrieved from their motor memory storage and translated into a process of muscle commands via muscle adjustments. Handwriting is influenced by a number of genetic, physiological and biomechanical factors, however the research regarding the visual feedback is partially*

*contradictory regarding the degree of its influence on the individual characteristics. A two-pronged approach was designed in order to investigate the degree of this influence: Samples of cursive and block handwriting written with and without visual feedback were collected by 40 volunteers and were imported in a PC via an opaque pen tablet using an electronic inking pen. The data was stored and analyzed in a handwriting movement analysis software module specially designed for this research, that was attached in the software MovAlyzeR by Neuroscript LLC. Peer reviewed forensic comparison by a forensic document examiner (FDE) between the two groups (that is the group of samples executed with normal visual feedback versus the group of samples executed without visual feedback) shows total lack of significant differences between samples of the two different conditions and the existence of a large corpus of similarities in the design and the pictorial aspect, regardless of the complexity of the samples. Six traits linked to the absence of visual feedback were found: change of overall size, non uniformity of left margins, change of slant, avoidance of pen lifts, inclusion of extra trajectories and decrease of line quality. Furthermore, it was established that the absence of visual feedback by itself cannot lead a trained FDE to an erroneous conclusion. The statistical analysis of the cursive handwriting shows that without visual feedback there is a significant increase in absolute and horizontal size as well as average pen pressure and a significant decrease in slant and vertical size, while in block handwriting there is a significant increase in absolute and horizontal size, average pen pressure as well as duration and a decrease in slant, average absolute velocity and vertical size. The comparative analysis suggests that the factors of gender, educational level and handedness creates an insignificant influence during the comparison of the two conditions of the researched individual characteristics. The combination of the above findings suggests that both types of writing (cursive and block handwriting) are governed by a single major open loop motor program, which is not significantly influenced by visual feedback -no evidence was found that visual feedback intervenes significantly in the procedure of allograph execution, but is mainly linked with the auxiliary order of macro-managing, inspection and possibly correction of the overall outcome of the combination of the above allographs.*

11. ICP grant project on DCS underway

Jan Zimmer, Stepanka Kulhava, Petra Moravcova, Institute of Criminalistics Prague, Czech Republic

*Since 2016 ICP has been working on a 5 year grant project aimed at examination of digitally captured signatures (DCS). In my presentation I will review the project design, inform what has been done so far and what is still to be worked on.*

12. Selected Aspects of Actual Cases

Nikolaos Kalantzis, Chartoularios P.C., Laboratory of Questioned Document Studies, Greece

*During actual casework cases will appear that either require special treatment or exhibit unlikely combinations of evidence. This sort presentation goes through several cases focusing on those aspects that can cause confusion or even mislead the Handwriting Expert if they are not treated with caution.*